

### **REMARKS**

After entry of this amendment, claims 1 and 4-23 are pending. New claim 23 has been added and finds support *inter alia* in the original claims. Further support for new claim 23 is found in the specification, for example, at page 47, lines 8-20 and page 53, lines 5-17. The claims have been amended without prejudice or disclaimer. Support for the amendments is found *inter alia* in the original claims. Claim 1 finds further support in the specification, for example, at page 10, line 17, through page 11, line 2. Claims 18 and 19 find further support in the original claim 12 and in the specification, for example, at page 32, lines 4-30. No new matter has been added.

### **Specification**

The abstract is objected to for consisting of more than one paragraph. In response, Applicants submit herewith an amended abstract as a separate sheet pursuant to 37 CFR § 1.72. In light of the present amendment, it is believed that the objection is overcome.

### **Claim Objections**

Claims 18 and 19 are objected to as being improper dependent form for failure to further limit the subject matter of a previous claim. In response, claims 18 and 19 have been amended without prejudice or disclaimer to correct the dependency and to provide further clarification. In view of the present amendments, the objections are believed to be rendered moot. Reconsideration and withdrawal of the objections is respectfully requested.

Claim 12 is objected to for reciting non-elected sequences, *i.e.* SEQ ID NO: 17 and 18. Applicants respectfully disagree. It is noted initially that SEQ ID NO: 17, which encodes SEQ ID NO: 18, represents a  $\Delta 6$ -desaturase from *Physcomitrella patens*. It is further noted that the sequence election made in the present application is merely a species election as indicated by the Examiner in the Office Communication dated October 30, 2007, at page 2. Accordingly, Applicants respectfully reserve all rights to consideration of claims to additional species which are written in dependent form or otherwise include all the limitations of an allowed generic claim as provided by 37 CFR § 1.141 upon the allowance of a generic claim.

**Claim Rejection – 35 U.S.C. § 103**

Claims 1 and 4-22 are rejected under 35 U.S.C. § 103(a) as being obvious over Knutzon *et al.* (hereinafter “Knutzon”), in view of Beaudoin *et al.* (hereinafter “Beaudoin”) and Parker-Barnes *et al.* (hereinafter “Parker-Barnes”), and further in view of GenBank Accession No. AX214446, Girke *et al.* (hereinafter “Girke”), and Mukerji (hereinafter “Mukerji”).

The Examiner relies on Knutzon for allegedly teaching producing polyunsaturated fatty acids (PUFAs) by transforming plants with constructs comprising nucleic acids encoding a  $\Delta 6$ -desaturase or a  $\Delta 5$ -desaturase, and recovery of PUFAs from the transgenic plants. The Examiner further relies on Knutzon for allegedly teaching the enzymatic pathways for synthesis of PUFAs using enzymes including a  $\Delta 6$ -desaturase, a  $\Delta 6$ -elongase and a  $\Delta 5$ -desaturase, as well as other desaturases. The Examiner acknowledges that Knutzon does not teach a nucleic acid encoding a  $\Delta 6$ -elongase, nor co-transformation of all three  $\Delta 6$ -desaturase, a  $\Delta 6$ -elongase and a  $\Delta 5$ -desaturase into a plant. The Examiner further acknowledges that Knutzon does not teach  $\Delta 6$ -desaturase-,  $\Delta 6$ -elongase- and  $\Delta 5$ -desaturase-coding sequences from either *Physcomitrella patens* or *Phaeodactylum tricornutum*. The Examiner, however, cites to Beaudoin and Parker-Barnes to show that elongase and desaturase activities can be combined in yeast cells to produce PUFAs. In addition, the Examiner cites to AX214446 for teaching a nucleotide sequence that is identical to SEQ ID NO: 3 and encodes a  $\Delta 6$ -elongase from *Physcomitrella patens*. The Examiner further cites to Girke and Mukerji for teaching a  $\Delta 6$ -desaturase from *Physcomitrella patens* and *Phaeodactylum tricornutum*, respectively. Based on the above alleged teachings, the Examiner concludes that the claimed process would have been obvious to one of ordinary skill in the art and that any known coding sequences for any of the enzyme activities would have been obvious choices.

Applicants respectfully disagree and traverse the rejection. However, to expedite prosecution, the claims have been amended without prejudice or disclaimer to recite the claimed process with more specificity. Applicants believe that the claims as amended overcome the rejection for the reasons already of record and for the following additional reasons.

The examiner bears the initial burden of establishing *prima facie* obviousness. See *In re Rijckaert*, 9 F.3d 1531, 1532, 28 USPQ2d 1955, 1956 (Fed. Cir. 1993). To support a *prima facie*

conclusion of obviousness, the prior art must disclose or suggest all the limitations of the claimed invention. See *In re Lowry*, 32 F.3d 1579, 1582, 32 USPQ2d 1031, 1034 (Fed. Cir. 1994).

It is noted initially that, as acknowledged by the Examiner, Knutzon does not teach  $\Delta 6$ -desaturase-,  $\Delta 6$ -elongase- and  $\Delta 5$ -desaturase-coding sequences from either *Physcomitrella patens* or *Phaeodactylum tricornutum*. It is further noted that none of the remaining cited references (*i.e.* Beaudoin, Parker-Barnes, AX214446, Girke, and Mukerji) teaches  $\Delta 5$ -desaturases from *Physcomitrella patens* and/or *Phaeodactylum tricornutum*, which is a limitation recited in the claims. Thus, even if combined, the combined teaching of the cited references does not teach or suggest every limitation of the claims and accordingly, a *prima facie* case of obviousness has not been established. For this reason alone, the rejection should be withdrawn.

Moreover, Applicants respectfully submit that, even if combined, the combined teaching of the cited references also does not teach or suggest the limitation newly added in claim 1. As described in the specification at page 10, line 17, through page 11, line 2, the compounds produced by the claimed process depend on the choice of the plant used as well as the fatty acid composition (C18:2- or C18:3-fatty acids) which prevails in the original plant. Thus, the precursors required for producing the compounds according to the present application are naturally present in the plant cell, plant or part thereof. As such, there is no need in the claimed process to provide exogenous substrate(s) or precursor(s) for the production of PUFAs. This is further illustrated in Example 8 and Figure 2, where transgenic tobacco plants expressing a  $\Delta 6$ -desaturase, a  $\Delta 6$ -elongase and a  $\Delta 5$ -desaturase produce arachidonic acid, a C20:4 fatty acid, in the seeds without the need to feed the transgenic plants C18:2- or C18:3-fatty acids because these C18:2- or C18:3-fatty acids already integrate parts of the naturally occurring fatty acids in the plant.

In contrast, the methods taught in Beaudoin and Parker-Barnes, both producing PUFAs in yeast, require exogenous substrate(s) to be added into the yeast culture medium for producing PUFAs. For example, C18:3, n-6, substrate was added into the culture medium for the synthesis of di-homo- $\gamma$ -linolenic acid, a C20:3 fatty acid, in yeast according to the method taught in Beaudoin. See Beaudoin at page 6422, right Col., last paragraph. Similarly,  $\gamma$ -linolenic acid (GLA) or stearidonic acid (STA) was added into the culture medium prior to subjecting the yeast

cells to fatty acid analysis in the method taught in Parker-Barnes. See Parker-Barnes at page 8286, left Col., 2<sup>nd</sup> paragraph. Thus, even if combined, the combined teaching of the cited references does not teach or suggest a process for the production of compounds in transgenic plants with no need to exogenously supplement precursors of the target compounds to be produced. Because the combined teaching of the cited references does not teach or suggest every limitation of the claims, a *prima facie* case of obviousness has not been established. For this additional reason, the rejection should be withdrawn.

For at least the above reasons and for the reasons already of record, Applicants respectfully submit that, even if combined, the combined teaching of the cited references does not render the claims as amended *prima facie* obvious because the combined teaching does not disclose or suggest all the limitations of the claims as amended. In light of the present amendments and the above remarks, reconsideration and withdrawal of this rejection is respectfully requested.

Separate consideration to new claim 23 is respectfully requested. Claim 23 further specifies that the at least one first nucleic acid sequence which encodes a polypeptide with an  $\Delta 6$ -desaturase activity comprises the sequence of SEQ ID NO: 13, a nucleic acid sequence encoding a polypeptide comprising the amino acid sequence of SEQ ID NO: 14, or a nucleic acid sequence encoding a polypeptide having at least 90% homology with the amino acid sequence of SEQ ID NO: 14 and having essentially the same enzymatic activity. As indicated by the Examiner in the Office Action at page 6, SEQ ID NO: 13 is free of the prior art of record. Thus, the cited references, even if combined, do not teach or suggest at least this limitation, and accordingly, do not render claim 23 *prima facie* obvious.

### **CONCLUSION**

For at least the above reasons, Applicants respectfully request withdrawal of the rejections and allowance of the claims. If any outstanding issues remain, the Examiner is invited to telephone the undersigned at the number given below.

This response is filed within the three-month period for response from the mailing of the Office Communication, to and including February 16, 2010. No further fee is believed due.

However, if an additional fee is due, the Director is authorized to charge our Deposit Account No. 03-2775, under Order No. 12810-00043-US from which the undersigned is authorized to draw.

Respectfully submitted,

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